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ABSTRACT

This study describes and evaluates key bibliometric patterns in the articles published by the former "Journal of Education for Librarianship" (JEL) during its first 24 volumes of existence from 1960 to 1984. Data from each issue of JEL were collected and analyzed using a statistical analysis software package, SPSSx (Statistical Package for the Social Sciences, Version X). Since becoming a refereed journal in 1971 (volume 12), JEL's scholarliness has increased dramatically--at least insofar as a quantitative indicator reveals. Before 1971, just more than half of all articles contained bibliographic citations. Since 1971, this proportion has grown steadily, and in the 1980s, 9 out of 10 articles were referenced. The number of citations per referenced article has also increased steadily, from 8 before refereeing to 17 in the 1980s. This article includes background information on the issue; a theoretical framework for studying bibliometric patterns; a review of the related literature; conceptual problems and definitions; explanation of data collection methods and procedures; study findings; and a summary and conclusions. Statistical comparisons, numerous data tables, codes, database exclusions, and project costs are appended. (Author/THC)

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A Bibliometric Study of the Journal of Education for Librarianship, 1960-1984: Full Report

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Abstract

This study describes and evaluates key bibliometric patterns in the articles published by the former Journal of Education for Librarianship (JEL) during its first 24 volumes of existence from 1960 to 1984. Data from each issue of JEL were collected and analyzed using SPSSx.

Since JEL became a refereed journal beginning with volume 12 in 1971, its scholarliness has increased dramatically--at least insofar as a quantitative indicator reveals. Before 1971, just over half of all articles contained bibliographic citations. Afterwards, this proportion grew steadily, and in the 1980s 9 out of 10 articles were referenced. The number of citations per referenced article has also increased steadily, from 8 before refereeing to 17 in the 1980s.

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A Bibliometric Study of the

Journal of Education for Librarianship, 1960-1984: Full Report

Statement of the Problem

This study addresses the question of what quantitative and evaluative statements can be made about the Journal of Education for Librarianship (JEL), now that it has completed 24 volumes of publication spanning the years from 1960 to 1984.[1] The Journal is the principle medium of formal communications in English for professional educators in library and information science, and it is the official publication of the Association for Library and Information Science Education (ALISE; formerly, AALS, the American Association of Library Schools).

The objectives of the present study are to investigate two clusters of questions about JEL during the period 1960-1984. The first cluster concerns the population of articles published by JEL during this period. Basic questions are as follows:

- How many and of what length were the articles published by JEL? What subject matter did they address? How often did they cite prior literature? Were they the product of author collaboration or of individual effort?
- Who were the contributing authors, in terms of the variables below: occupational status, geographical location, gender, typical number of article contributions to JEL, and, author identities of highest contributors?

The second cluster of questions concerns the population of bibliographic

citations found in JEL articles over the study period, namely the following:

- What were the bibliometric characteristics of cited works, in terms of: number, frequency, frequency per article page, age, publication format, and, authorship collaboration?
- What were the titles of journals most frequently cited? What was their productivity in terms of citation yield?
- What were the titles of the most cited publications? Who were the most cited authors and editors? What was the productivity of these respective titles, authors, and editors in terms of their citation yield?

Finally, what were the major shifts in these bibliometric variables over the study period from 1960 to 1984? In particular, did the adoption of manuscript refereeing in 1971 have a discernible effect on any of these bibliometric dimensions and on the scholarliness of the Journal? For the purposes of this study, it was hypothesized that a statistically significant difference would be apparent in the proportion of articles with bibliographic citations before and after the institution of the refereeing policy. The null hypothesis was that refereeing had made no difference at all in the proportion of articles with citations. Although there may have been statistical differences on other variables, there was no plausible theoretical justification for testing any of them.

Background to the Problem

In the summer of 1960, when JEL was launched as the official publication of AALS, it proposed to address an ambitious agenda of questions which it had inherited from its three antecedent publications:

> What do they teach in library schools?
> How do they teach it?
> Who are the teachers?
> Who are the students?
> What do they know and do about research?
> What does the AALS think, and do, and say?
> What are related problems of education for librarianship abroad?
> How do the changing needs of libraries affect the education of librarians?[2]

The Journal indicated that answers would be sought through a combination of approaches: signed articles exploring different aspects of library education; surveys of writings about education for librarianship; reviews of dissertations and other research projects connected with library schools; an annual faculty directory; statistics about faculty and students; official reports of AALS activities; substantial reports of other associations concerned with education for librarianship including the annual report of the Committee on Accreditation; a quarterly chronicle featuring short new items, summaries of workshops and institutes, and a calendar of events; and, a forum for "letters of thoughtful comment on the contents of the journal and also on the broader issues of professional education".[3]

The Journal began by intermixing scholarly articles and occasional or regular columns dealing with some of the above topics.[4] Commencing with volume 4, issue number 4, 1964, news accounts of conferences and meetings plus such aforementioned feature items were shifted to a general section entitled "Of Special Interest".[5] Other columns, such as the "Teacher's Section" and a book review section entitled "In Review", were later added to "Of Special Interest".[6]

In 1967, Sam Rothstein, the President of AALS, called for a new approach to AALS annual meetings in which "scholarly, meaningful discussions of library science education" would be encouraged.[7] Concomitantly, a more invigorating Journal was also envisioned.

Occasional editorial themes in the early volumes of JEL were of two kinds. One was a plea for a more responsive readership. In 1968, the editor wrote: "Last month we received one communication. Is anyone reading this journal?"[8] The other theme was a somewhat qualified invitation by the editor for more substantive manuscript contributions: "thoughtful material (footnotes and all), but let it be truly intellectual and not inane".[9] Sometimes the invitation was simply for more submissions.

Notable departures in JEL editorial policies and practices occurred with the first issue of volume 12, in the summer of 1971.[10] At that time, JEL became a refereed journal. Manuscripts were to be reviewed not only by the editor but also by two or more experts who would be selected by the editor normally from the ranks of the editorial board or, on occasion, from the AALS membership. At the same time, members of the editorial board became official advisors to the editor and through that office to the Association's board of directors.

Also at that time, in order to ensure greater security of tenure and more editorial independence, the editor was given a fixed length of appointment, after which renewal was to be at the option of the Association's board of directors.

Since the Spring 1977 issue, formal "Guidelines for Authors" have been published once a year. Four types of contributions considered acceptable for

publication in the Journal were described in the 1977 announcement:

> Major articles of approximately 3,000 words: scholarly papers relevant to library and information science education; papers with quantitative evaluation of teaching methods; state-of-the-art reviews in the field; reports of studies pertaining to library and information science education, highlighting results and implications; and reports, with supporting data, on such topics as manpower, student admissions, student retention, placement, continuing education and non-traditional study; etc.
>
> Brief communications of 1,500 words or less: papers reporting unique ideas that have been applied to teaching library and information science courses; novel use of a teaching method or teaching aids; motivational techniques, etc.
>
> Reader comments of 850 words or less: brief statements of opinion, of divergent viewpoints, or constructive criticism.
>
> Guest editorials of 850 words or less: cogent points of view on topics of exceptional and timely interest to the profession.''

The editorial policy of the Journal has been remarkably consistent over the years. The first formulation appeared in volume 1''[3] and remained unchanged until volume 12, summer 1971.''[4] The contemporary statement of editorial policy appeared in volume 17, spring 1977.''[5]

Another factor which may have contributed to the stability of the Journal editorial policy is that there have been relatively few changes of editorship. Only 5 editors have served during the 24 years under study:

Harold Lancour, 1960-1964

William A. Katz, 1964-1971

Norman Horrocks, 1971-1976

Lucille M. Wert, 1976-1980

Charles D. Patterson, 1980-date.

Some additional current facts about JEL are the following:

1. Manuscript contributions

1981 - 66
1982 - 53, including 11 from authors outside the U.S.A.
1983 - 43, including 8 from authors outside the U.S.A.
1984 - 49, including 8 from authors outside the U.S.A.[9]

Manuscript acceptance rate: approximately 25%[10]
Notification to manuscript contributor: 6-9 months
Publication time lapse after notification: 6 months[11]

2. Secondary access[12]

Current Contents
Education Index
Educational Resources Information Centre
Index to Journals in Education
Library and Information Science Abstracts
Library Literature
Social Sciences Citation Index

3. Circulation

1961 - 1200 subscribers per issue, including 138 subscribers in 43 countries[13]
1982 - 2000 subscribers per issue, including subscribers in 84 countries.[14]

4. Readership survey

In the fall of 1984, a JEL readership survey was conducted in order to obtain quantitative feedback on users' views about the Journal's current quality and about future topics and priorities germane to library and information science education. In his covering letter to subscribers, the editor noted that the major purposes of the Journal are "to report original research relating to education and to serve as a vehicle to keep the membership informed of Association activities".[15]

The Problem in Perspective

Objective description and appraisal of JEL's publication record is timely, for two reasons. The first reason is that some fifteen years have passed since Donald Lehnus published his 10-year analysis of the journal literature of library science education, for the period 1960-1970. Although the scope of his investigation was broader than JEL itself, this Journal was clearly his focus of interest. Even the title of his paper reflected it: "JEL, 1960-1970; An Analytical Study."[22]

Of particular interest to Lehnus was whether there existed a core of highly cited authors and highly cited papers within the body of literature relating to education for librarianship. If so, one might be able to identify a research front and citation classics in the field. Moreover, he conjectured that it would then be possible to predict who the major contributors to the literature would be in the future.

Among the findings reported by Lehnus were the following:

- Fifty-five percent of the JEL articles were unreferenced (130 out of 235 papers);
- There was an average of eight references per article among the remaining 105 papers in JEL, and the range was from one to thirty-two;
- Self-citation frequency among referenced JEL articles accounted for 5.5 percent of all citations (46 out of 838 total);
- Fourteen percent of the citations in JEL articles were to the literature of education while an additional twenty-two percent of the citations were to works outside both library science and education;

- Regardless of subject domain, 43 percent of all citations in JEL articles were to journals and 52 percent were to books, pamphlets, conferences, reports, and the like, while less than one percent were to doctoral dissertations;
- Over half of the citations in JEL articles were five years or less in age at the time of their use (449 out of 838 total);
- Ten authors were cited six or more times each in JEL articles and they were, in descending rank, Shores, Carnovsky, Shera, Berelson, Bonk, Reed, Danton, Wasserman, Williamson, and Lancour;
- Only two works received as many as six citations in JEL articles: Training for Library Service by Williamson (1923), and Problems of Library School Administration edited by Reed (1965).

The early JEL profile sketched by Lehnus was a gloomy one: an unscholarly (and unrefereed) journal with a large proportion of unreferenced articles, no sharply discernible research front of contributing and cited authors, and no core literature of citation classics. He conjectured that:

> If the paucity of documented articles in a given area indicates a lack of serious inquiry, then the evidence ... might indicate that there are few research articles appearing in this professional journal.[23]

With respect to those articles in JEL which contained bibliographic citations, analysis revealed no strong citing preferences either for authors or for papers. Thus, the existence of a research front or of citation classics in library science education could not be claimed.

Moreover, he predicted that unless deficiencies were addressed soon, JEL would not be a major force in future educational inquiry. He wrote:

> It is not the journal which is to blame, but rather we in the field who are not doing the necessary research and using JEL to transmit

it to our peers in the field of library [science] education.[24]

The question arises, then: To what extent is the earlier Lehnus profile of JEL still valid? Some quantitative evidence of the current validity of this profile is desirable, in order that we can more adequately assess the recent record of JEL in transmitting the results of scholarly inquiry and so that we can more adequately characterize the state of current research in library and information science education.

Moreover, an appraisal of JEL's record of performance over the past quarter century is timely because AALS, its sponsoring body, has recast its formal identity. At the beginning of 1983, AALS became ALISE, the Association for Library and Information Science Education. In urging the membership of the Association to adopt the new name, the board of directors provided the following rationale:

> [The] Association is predominantly made up of personal members, is international in scope, its objective includes information science, and ... the majority of members work in schools, the names of which include "information" ....[25]

In addition, commencing with the anniversary issue of volume 25 in the summer of 1985, JEL becomes JELIS, the Journal of Education for Library and Information Science. In announcing the change in name, the Editor emphasized the dramatic impact of technological advances on all aspects of the information professions, and suggested that the new title would describe more adequately "who we are and what we are trying to do". Moreover, he noted that the new title also reflected the "necessarily expanded goals and objectives of the Association." He concluded by indicating that:

> As the Journal moves toward its second quarter century, let us hope that, regardless of its name, it will continue to report and reflect that which is important to us in supporting and extending our efforts to educate those who choose to enter library and information service and the many and diversified information professions.[26]

At the time of this writing, it is understandably a matter of mere speculation to suggest whether, how, and at what future point the titular change will become manifested in the substantive pages of the Journal.

Thus, again, in order to provide a point of comparison, there is a need for enhanced knowledge about JEL's record. Quantitative evidence of extant patterns is needed in order to help inform the perspective of educators, researchers, educational policymakers, and policymakers connected with the Journal and with ALISE.

In short, is it the case that the Journal has now become, as the editor recently wrote, "the preeminent journal in library and information science education in the world"?[37] And can it remain so, in the face of competition from the new journal which began publishing in March, 1983, Education for Information: The International Review of Education and Training in Library and Information Science edited by R.F. Guy and J.A. Large and published by Elsevier Science Publishers?[38]

Theoretical Framework

This study describes and evaluates key bibliometric patterns in the articles published by JEL during its first twenty-four years of existence. The work, then, is a partial replication of the Lehnus study. In addition, it endeavors to "rigor up" the application of bibliometric concepts and to extend the scope of investigation. It is hoped that a more comprehensive characterization of JEL will thus be realized.

One objective of bibliometric research is to reveal how authors in a field or field subset organize and communicate their intellectual efforts. The efforts thus revealed can be those at a given point in time or those over a period of time. Of particular interest is the discovery of probable trends which can be inferred from large-scale shifts in bibliometric patterns.

Bibliometric patterns try to portray a certain kind of human behavior with respect to the flow of information. This is the behavior of scholarly authors and their many "gatekeepers" such as editors, referees, and publishers. Scholarly authors and their gatekeepers do more than assist in a flow of information. Ideally, only certain information is permitted to "flow"--information that is the product of rational inquiry--and this particular kind of information must pass through a variety of quality control processes, including the reaction at large of the community of scholarly consumers.

On the other hand, whatever the quality level of information flow, there is no direct way of empirically observing and measuring it. Only certain tangible proxies, certain cultural artifacts, exist which are manifestations of this flow. These artifacts are scholarly publications.

From these artifactual manifestations, it is possible to infer a variety of bibliometric characteristics of scholarly research and productivity. As Bazerman noted in a profoundly revealing comparison of the relations between knowledge and academic discourse in the three domains of science, social science, and the humanities, the focus in such textual research is structural but the consequences and import are functional. "From the shape of things, one can better understand how things happen".[29] Frohmann has noted in addition that: "Just as a command of geography aids navigation, a good representation of the structural characteristics of a discipline helps both researcher and scholar to identify issues and problems in the field".[30] Thus, bibliometric research aims at visualizing and describing the authors who create such structural patterns, with particular emphasis on their publication habits.

Thus, by investigating and describing the formal characteristics of JEL--bibliometric variables such as subject matter of articles, age of cited works, publication format of cited works, and research insularity versus internationality--the present study tries, at the same time, to characterize the primary authorship of the educational literature and to shed light on the essence of the field itself. In particular, citation patterns--the ways in which authors cite the work of their peers (and of others)--are a rich source of quantifiable data about publication phenomena. Accordingly, they are subjected to close analysis for what they are able to reveal about the citing authors themselves, and about their field at large.

Bibliometric research methodology is founded upon a number of theoretical propositions, some of which are of longstanding and continuing debate. Recent treatments are by Cronin, Line, Smith, Garfield, and Oromaner.[31] These theoretical propositions concern: the relationship between a field and its literature, the relationship between intellectual competition and consensus,

and the relationship between scholarship and citation.

The first theoretical proposition is that the literature of a field, the archival record of cognitive effort expended by a community of authors, represents the field itself. That is to say, all the important problems and issues addressed by the intellectual community have been documented for peer review and have survived the field's formal systems of refereeing, editing, and publishing. This condition may not be satisfied in the short term, since a great deal of research effort that ends in blind alleys and in other unsuccessful strategems never gets written up for public consumption. Generally speaking, what authors report in the literature is success, not failure.

Another theoretical proposition forming the intellectual foundations of bibliometric research is that normal science is, simultaneously, both institutionalized competition and a highly cooperative and consensible activity. It is, as Ziman has phrased it, "the corporate product of a vast social institution."[32] From this consensus-producing effort, certain implications may be derived with respect to the relationship between scholarship and the citing norms of scientists. Ziman observed that:

> Scientific papers are derivative, and very largely unoriginal, because they lean heavily on previous research. The evidence for this is plain to see, in the long list of citations that must always be published with every new contribution. These citations not only vouch for the authority and relevance of the statements that they are called upon to support; they embed the whole work in a context of previous achievements and current aspirations. It is very rare to find a reputable paper that contains no references to other research. Indeed, one relies on the citations to show its place in the whole scientific structure just as one relies on a man's kinship affiliations to show his place in his tribe.[33]

Thus, any investigation of bibliographic citation patterns rests on the proposition that cited works are more useful, more germane, to the collective knowledge base of a field than works not cited. The extent to which this

theoretical view is valid, however, is a matter of considerable conjecture--and, concomitantly, a matter of very limited empirical study. For instance, it has been claimed that authors do not actually read all that they cite, and of course it goes without saying that they do not cite all that they read. As well, Oromaner argued recently that citations may not indicate the most innovative and creative work. Moreover, recent research into the functioning of citations in papers suggests that up to one-half of them could be considered redundant, perfunctory, or ceremonial.[34]

It has also been demonstrated that a researcher does not automatically select the best research papers for review and citation. The factor of document accessibility--in terms of form, place of origin, age, language, coverage by secondary services--may be of equal or greater importance than quality in an author's selection decisions.[35]

In the absence of a satisfactory theory of citing, there is little understanding of the relationships which exist between citing and cited documents. At the heart of the problem, according to Cronin, is the unknown motivation of authors.[36] This involves a mysterious interplay of both sociological and psychological factors, particularly the relationship between an individual's personality, background, cognitive style, professional training and experience, belief system, and the professional milieu both in terms of the specific research at hand and the commmunication systems governing the dissemination of that research.

Cronin observed that:

> Ultimately, citation is a private process (Chubin and Moitra, 1975) albeit a private process with a public face. The essential subjectivity of the act of citing means that the reasons why an author cites as he does must remain a matter for conjecture. What is lacking, in Swanson's (1977) view, is a rapid and convenient measure for discovering the relevance link which the citing author

> has established. This conjectural element is worth pursuing, precisely because the end-product of the private process (the citation) acquires the status of a public commodity.[37]

He concluded that:

> We cannot say that citation is an activity governed by adherence to a specific and universally recognised set of norms. By the same token, the evidence does not permit us to conclude that the practice is characterised by randomness and inconsistency.[38]

Thus, the nature of inter-document linkages is not amenable to objective scrutiny. The most satisfactory explanation may turn out to be, as Cronin and others have argued, that citation is an instance of tacit knowledge, a kind of craft skill acquired and exercised, largely without conscious reflection, through the educational and institutional processes of socialization or enculturation.[39]

Citation analysis is a very general measure of the utility of the contribution made by an individual to cognitive progress in a field. Utility is thus not to be equated with importance or impact: a highly cited work is one that has been found useful by a relatively large number of publishing peers.[40]

Other theoretical premises issue from the nature and quantification of citation phenomena. A fundamental one in terms of data collection and analysis is that each citation is of equal weight with a fixed value of one. By reverse inference, therefore, each citation would have been of equal utility and relevance to the citing author. Typically, citation studies have ignored factors such as the location of citations within a paper[41] and multiple mention.[42] As Cronin has pointed out, future studies of citations should concentrate on their context, their content, and on the conditions of their creation and application.[43]

In spite of some degree of extant theoretical inadequacy, citation analysis reveals not only the structure of publication utility within a field, but it also reveals the career patterns of publications themselves: How many perish? How many survive, and for how long? What and who replaces them? Such questions are the driving force behind bibliometric analysis; and it appears that, at least for a time, theoretical advances are more likely to issue from the failures and frustrations of slightly blind empirical researchers than from theorists concentrating upon formal analysis. This may be attributable in large part to the relative simplicity of verificational procedures required to investigate the relevant research questions, because bibliometric research uses as units of analysis those cultural artifacts issuing from author and gatekeeper phenomena: source publications, their careers, and their citations. As such, these units of analysis permit the implementation of procedures that are entirely unobtrusive and non-reactive.

Review of Related Literature

Since the Lehnus study in 1971, a number of bibliometric investigations of library and information science have been reported in the literature. Several of these have focused on the nature of secondary information services while others have focused on the role of annual reviews and still others have investigated the characteristics of a particular form of literature, such as doctoral dissertations or periodicals. A recent group of bibliometric studies has tried to describe the parameters of the domain itself, or of subject subsets of the domain, typically through analysis of the relevant journal literature. Notable work has been reported on two subsets of the domain: 1) the literature of library administration, by Hittermeyer and Houser;[44] and, 2) the literature of cataloguing and classification, by Frohmann.[45] The methodology of the present work is modelled on their approaches. Also, the findings of the present work are compared briefly with their findings, as a way of giving some quantitative context to the JEL data analysis.

In addition to the types of bibliometric studies identified above, there are a number of single journal and multiple journal studies in the field that merit reference. These are the doctoral dissertations by Peritz[46] and by Cline.[47]

Peritz attempted to describe the "research papers" published by twenty-four core library science journals during five time periods, 1950, 1960, 1965, 1970, and 1975. This work is flawed by two conceptual problems. The first is that the twenty-four journals which are claimed to constitute the core are selected through an arbitrary and idiosyncratic procedure for which no theoretical justification is presented by the author. The second--and much more serious--problem is that the concept of a "research paper" is neither

theoretically nor operationally defined by the author. De novo, the author formulates the following definition of the term "research": "any inquiry which is carried out, at least to some degree, by a systematic method with the purpose of eliciting some new facts, concepts or ideas"[6] (Peritz's emphasis). This definition--for which no prior source was given for the understandable reason that there was none--is not drawn from the primary literature of epistemology.

In another place, she asserts that it is a "well known fact that not all scholarly papers are research papers."[7] This statement is not explained. Nor is an adequate explanation given for excluding review articles from the study.[8] Moreover, several terms within the definition are left undefined, as though self-evident; however, the adequacy of the definition hinges on their explication. What is an "inquiry"? What is a "systematic method at least to some degree"? What is a "new" fact, concept, or idea? Without explication of all of these defining terms, the author's definition of research remains vague and thus inadequate as a basis for emperical research: How are we to know a "research" from a "non-research" paper when we see one? Necessary and sufficient conditions for using these terms are not given.

Moreover, the author violates even the definition which she formulated, in noting later in her work that research papers of two or less pages were excluded, because "for papers as short as this, it is very difficult to distinguish between reports of research, casual notes, marginalia, comments and pieces of scholarly polemic."[9] Ironically, the two-page criterion is the only reliable (if not conceptually valid) operational indicator presented by the researcher.

Hence, it must be concluded that inter-subjective agreement and conceptual consensus in the community cannot be attained as a consequence. The study results may very well be as much an artifact of the author's classificatory decisions as of the journal articles themselves. This can be illustrated by the following instance. The author found that JEL, for the four years examined (1960, 1965, 1970, 1975), contained less than twenty percent research papers.[83]

Nonetheless, even a very gross operational indicator of research activity must be that prior research is acknowledged by means of bibliographic citations. "Unreferenced research" (Peritz's phrase[84]), that is, research that does not acknowledge antecedent work, is inconceivable, for no researcher has ever started de novo, at least certainly not in the twentieth century. "Unreferenced research" is a contradiction in terms--research always starts from what is already known. On this parameter, for the years of JEL examined by Peritz, sixty percent of the 89 articles published by the Journal contained bibliographic citations. This percentage is an objective and replicable figure. Peritz's twenty percent "research" figure for JEL articles is not.

Another fundamental weakness in the quest for a subset of "research papers" within the population of journal articles is that one could conjecture that all journal articles constituted research papers in the eyes of not only their authors but of the journal editors and other gatekeepers. That is to say, for most journals purporting to report scholarly communications, acceptance of a manuscript for publication automatically confers upon it the status of research paper--even if it is later judged by the broader community of informal opinion to be of poor quality, or without heuristic value. On this basis, it is the editors and their juries who decide what is to be counted, at least for that time, as research--not subsequent investigators

whose evaluative criteria are unstated and so not replicable. The conceptual flaws render findings and conclusions invalid.

Cline's work, a longitudinal citation analysis of College and Research Libraries and Special Libraries, is also conceptually flawed, but there is a methodological weakness that is of more immediate concern here: "All references listed as Ibid. or Op. Cit. were included."[84] This multiple counting of bibliographic references is contrary to the well-established convention in bibliometric research of counting each cited work only once in each citing work. "Ibid.'s" and "op. cit.'s" may possibly reveal how important a particular work was to the citing author, but such multiple counting results in an artificial inflation of citation frequencies, and hence renders data incompatible with the data from other bibliometric studies in which the conventional approach has been followed.

Although a number of comparative demographic studies of journal article authors have recently appeared, they have proven to be narrow in scope and of very limited theoretical interest. Somewhat more germane to the present study is a content analysis by Goldhor of a sample of twelve issues of Library Journal covering the years 1958 to 1980.[85] His objective was to categorize publication content into four types--advertisements, book reviews, articles, and text departments--and to describe salient quantitative features of each type; for example, number of pages devoted to each type. With respect to articles, additional bibliometric variables were studied: articles per issue; subject matter of articles; types of methodologies followed in articles; authorship collaboration; occupational status of article authors; unreferenced articles; and, citations per referenced article. Although Library Journal does not purport to be a vehicle of scholarly communication--indeed, perhaps because of this very condition--comparison with a scholarly journal would

accent their differences. In the absence of comparable data from other single journal studies, this comparison at least provides for the likelihood of large differences on a number of bibliometric variables; for example, the proportion of unreferenced to referenced articles, and citations per referenced article. These data will be noted later, in the section on findings.

Findings from two other journal studies will also be treated later. These are: Meadows' and Zaborowski's very brief profile of the Journal of the American Society for Information Science (JASIS),[56] and a brief summary translated by Wellisch of a comparative citation analysis of JASIS and Nachrichten fur Dokumentation, undertaken as a master's thesis by Eisenhardt.[57]

Conceptual Problems and Definitions

Of course, the most important study for the present work is Lehnus' bibliometric analysis of JEL. Although some of the Lehnus data for the decade 1960 to 1970 can be used to compare with the data collected here for the later years, he did not address the following variables of interest in the present work: the proportion of pages devoted to articles versus news reports; the subjects treated in JEL articles; authorship collaboration; the demographic parameters of contributing authors; citation frequency per article and per article page; and cited authorship collaboration.

Moreover, some of the data could not be used because of conceptual difficulties. The most important issues from the need for a more rigorous definition of the notion of a journal "article".

1. Article

Lehnus defined an "article" as:

> any contribution that was not a regular feature item of the journal. News notices of meetings, new accreditations, faculty appointments, etc., were not considered as articles. In the case of JEL all the news items of the activities of the AALS, as well as its annual directory of library educators were not considered as articles. In the composite articles where the writing of each individual is separable and distinguishable each was counted as a separate articles; but an article written jointly without such distinction was considered as a single article.[58]

Although data collection was commenced on the basis of the Lehnus approach, its inadequacy for operational decisions was almost immediately evident. Neither the bibliometric literature nor professional glossaries were helpful in clarifying the matter. The 1984 edition of Harrod's Glossary gives the following definition of "article":

> A contribution written by one or more persons for publication in a PERIODICAL (q.v.); such a contribution when so published. See also WORK.[59]

The definition of "work" is:

> Any expression of thought in language, signs or symbols, or other media for record and communication [i.e. a work before printing or other publication]. After publication it becomes a "published work". See also DOCUMENT. A work is now generally taken to mean a published DOCUMENT (q.v.) varying in extent from a single paper (see PAPER 2) or ARTICLE (q.v.) to a contribution to knowledge written by one or more persons and published in several volumes, or even all the published writings by one person. It is also used to include a series of related but separate series (see SERIES 1,2,2) or PERIODICALS (q.v.) [60].

The 1983 Glossary of the American Library Association defines "article" as:

> A work of prose, identified by its own title or heading and frequently by its author, in a document that contains many such works, e.g., an article in a periodical or encyclopedia.[61]

The 1973 edition of Elsevier's Dictionary defines "article" as:

> A literary composition in a journal or magazine, etcetera.[62]

The 1966 Oxford English Dictionary gives the following definition of "article" :

> A literary composition forming materially part of a journal, magazine, encyclopaedia, or other collection, but treating a specific topic distinctly and independently. (Here the idea of a section or part of the book, is quite subordinated to that of the independent character of the 'article.' It is one of the articles in the paper, as distinguished from the articles of this Dictionary.)[63] (emphasis in original)

The inadequacy of Lehnus' definition of "article" was particularly evident for the early years of the Journal, when, as already pointed out, news reports of various issues and activities and news summaries of meetings, committees, panel discussions, discussion groups, symposia, conferences, and the like appeared intermixed with articles. Also intermixed with articles in the early years were reports of current statistical data on library school enrollment and reports of related professional associations and committees.

Finally, items such as "Teaching and Practice of Reference Service"[44] were also intermixed with articles in the early years.

Lehnus classified as articles some items which were news reports on various matters or journalistic summaries of meetings, symposia, conferences, and the like. These reports and summaries were not papers prepared and read at the events but rather were second-hand accounts. This categorization tended to inflate the JEL article count.

In the present study, items of this kind were excluded from the category of "articles". Titles of all excluded items are listed in Appendix I. In order to render classification decisions more credible, all items whose status as articles or news reports was not readily apparent were judged, independently of each other, by two colleagues. Items so referred totalled 23. Of these items, both referees agreed to exclude all but four. (The authors excluded them also.)

The effect of this more rigorous conceptualization of JEL articles is to reduce their number from Lehnus' population for the 1960-1970 period of 235 to 219 in the present work. Such a difference has important implications for bibliometric variables; for example, proportion of total pages devoted to articles, overall article scholarliness, frequency of citations per article, and contributing author demographics.

2. Article Subject

The subject or subjects treated by JEL articles were assigned from the official cumulative subject indexes produced by Charles D. Patterson, current Editor of the Journal.[45] These indexes cover the period 1960 to 1980 only, volumes 1 to 20; consequently, no subject heading assignments were made for the subsequent years, volumes 21 to 24 inclusive. Excluded from the analysis of subject coverage were all index terms relating to the affairs of AALS and other associations, to regular features of the Journal, and to news reports carried by the Journal.

3. Bibliographic Citation

The terms "citation" and "reference" as used to denote bibliographic items in an article note or footnote are synonymous. They were interpreted following Lehnus' criteria as closely as possible:

> Any reference to an article, book, letter, personal notes and interviews, etc., was considered as a citation. Several references to the same item in one article were considered as a single citation. Works to which the reader was referred for further information were also considered as citations. Excluded were all items intended as a bibliography per se, and not as a list of items of notes or references for the article.[46]

If an author included a section of "additional references", these were included as citations in the present study, but a "bibliography" or a list of examples was excluded. Standard sources, such as the ALA Glossary of Library and Information Science, Harrod's Librarians' Glossary, Elsevier's Dictionary of Library Science, Information and Documentation, as well as Webster's Third International Dictionary and the Oxford English Dictionary, were searched to ensure that decisions as to what constituted a citation were in keeping with the spirit of accepted usage. In ambiguous cases, independent judgments were made by two researchers and consensus was established.

The 1984 edition of Harrod's Glossary gives the following definition of "citation":

> A reference to a text or part of a text identifying the document in which it may be found. See also REFERENCES: A list of publications to which an author has made specific reference; usually placed at the end of an article or chapter, or at the end of a book, sometimes in chapter order. The entries are usually arranged in number order, corresponding numbers appearing in the text. Also called "Citations".[67]

The 1983 ALA Glossary defines "citation" as:

> A note referring to a work from which a passage is quoted or to some source as authority for a statement or proposition.[68]

Cline followed Price's usage of the terms "reference" and "citation" in her dissertation:

> It seems to me a great pity to waste a good technical term by using the words citation and reference interchangeably. I, therefore, propose and adopt the convention that if Paper R contains a bibliographic footnote using and describing Paper C, then R contains a reference to C, and C has a citation from R. The number of references a paper has is measured by the number of items in its bibliography as endnotes and footnotes, etc., while the number of citations a paper has is found by looking it up in some sort of citation index and seeing how many other papers mention it.[69]

Bertram, in her 1970 dissertation concerning citation analysis, defined "citation" and related terms as:

> Citation: the indication given in the document (usually by means of a superscript or the last name of the author plus the date of publication) which leads to the specific footnote which should be consulted for further information. Citation is also used as the more inclusive term indicating the whole sequence involved in the referring by one document to another document.
>
> Footnote: the physical entity, the group of words located at the bottom of the page or in a list at the end of the document.
>
> Reference: the bibliographic or non-bibliographic information contained in the footnote. (Text is defined in a similar manner to mean the information contained in the document, while the document is the physical item.)
>
> Bibliographic citation: the bibliographic information (in this case given in the footnote) which leads to the specific document which is to be consulted for futher information.[70]

The 1973 edition of Elsevier's Dictionary defines "citation" as: "a reference", "to cite" as: "to quote a passage, book, or author", and a "reference" as: "an indication of where to find specific information, e.g. a document, author, etc."[71]

The 1973 Oxford English Dictionary gives the following definition of "citation":

> The action of citing or quoting any words or written passage, quotation;
>
> and "to cite" as: To quote (a passage, book, or author); gen. with implication of adducing as an authority.[72]

Anselmo in her dissertation used the following:

> Citation: a footnote or a bibliographic reference to any published work
>
> Citer: a person who, in a bibliographic reference or in a footnote, refers to any published work.[73]

In the present study, if the article text contained a bibliography but no bibliographic reference in the "Notes" or "Reference" section at the end of the article, such a bibliography was excluded. The following were articles in JEL found to have embedded bibliographies:

> Vol. 6:1, p. 27
> Vol. 7:4, p.210
> Vol. 9:2, p. 95
> Vol.10:1, p. 3.

Also, in the case of anthologies whose contents were cited several times, Lehnus counted as a citation not only the cited author but the anthology editor as well.[74] While editorships are of interest here, as well, the effect of such double counting was to inflate the citation frequencies of authors-cum-editors. On the other hand, Lehnus' Table 6 of "authors who were cited at least three times" appears to contradict the stated approach; Reed, for example, received three citations according to this table, but according to Table 8 she received six citations as an editor.[75]

Moreover, Lehnus' Table 6 of "authors who were cited at least three times" is misleading because he excluded individuals who had only one title cited, even though such a title might have been cited by many different authors. Lehnus does not indicate how many authors went unreported as a consequence. This is enigmatic if the research objective is to identify highly cited authors and highly cited titles.[76]

4. Scholarliness

Windsor and Windsor conducted a study of information scientists and the citing of their own publications. Their study proposed as a measure of the scholarly status of a field "the ratio of papers without references to those with references."[77] One criterion for regarding publications as "scholarly" is coherence in relation to past knowledge. Therefore, one indicator of scholarliness should be the presence of formal acknowledgements of that foundational knowledge and its creators, through bibliographic citations. The concept of scholarliness can thus be given a partially measurable form in the phenomenon of bibliographic citations. However, this theoretical framework does not provide for how much knowledge must be formally acknowledged, so that more citations do not automatically or necessarily imply a greater degree of scholarliness. Footnote quantity is not an indicator of research quality.

5. Publication Format

Another conceptual difficulty which makes previous data unusable relates to Lehnus' classification of publication formats,[78] with particular reference to his overly broad format of "books, pamphlets, conferences, and reports" as a single category. In addition, the level of precision reported in the Lehnus

data does not permit longitudinal comparison among variables, and so multi-faceted shifts in bibliometric patterns cannot be identified. For example, the age distribution of cited works is grouped into five-year intervals and so a more detailed analysis of patterns of most recent citations is not possible. Also, no overall frequency distribution of citations by author is presented in tabular form; only grouped data are mentioned in the text.

There is a need for more clarity in the glossaries which attempt to standardize concepts in library and information science, as these do not always discriminate between publication form or format, and publication function.

The ALA Glossary defines "format" as: "in its widest sense any particular physical representation of a document",[9] and "document" as:

> A physical entity of any substance on which is recorded all or part of a work or multiple works. Documents include books and booklike materials, printed sheets, graphics, manuscripts, audiorecordings, videorecordings, motion pictures, and machine-readable data files.[10]

This glossary further defines "publication" as: "a published document", as well as:

> the act or process of distributing copies of a work to the public by sale or other transfer of ownership, or by rental, lease, or lending. The offering to distribute copies to a group of persons for purposes of further distribution, public performance, or public display also constitutes publication.[11]

To "publish" is: "to have a document manufactured and made available to the public," while published is "said of a document that has been made available to the public".[12]

Harrod's Glossary treats publication format similarly, defining "format" as:

> A term used to describe the appearance and make-up of a book; its size, shape, paper, type, binding, illustrations, etc.

and a "publication" as:

> A work issued to the public in the form of a document or book; [or] the act of issuing a book to the public;

while "published" is said to be:

> A document which has been reproduced in a number of copies and made available to the public to whom it may be sold or distributed free of charge and whether or not it is intended to have a restricted readership such as to members of parliament, of a learned, professional, or political organization.[83]

Based on the existing definitions, then, "publication format" in the present study refers to the physical identity of a recorded work and implies the dissemination or transfer of intellectual content, so as to satisfy conditions of the publication process. However, it should be noted that references to unpublished documents are also included.

There is no consensus in previous citation analyses on a standard typology of publication formats. Some studies use a very simple set of types, such as: journal, monograph, and other. Yet other studies, such as Cline's,[84] use a somewhat more elaborate typology.

In his analysis of JEL citations, Lehnus created five major categories for type of publication format:

- periodicals;
- books, pamphlets, conferences, reports, etc.;
- letters, speeches, interviews, etc.;
- Ph.D. theses; and,
- Master's theses.[85]

However, neither Lehnus nor others have produced a set of format categories suitable to capture the variety of publication formats cited in JEL articles. The typology which was developed for the present study included 17

categories, and is listed in Appendix II. Whereas Lehnus termed his first category "periodicals," the current JEL investigation treated journals, newsletters, and annual reviews separately. Similarly, whereas Lehnus combined books with pamphlets, conference proceedings, conference news, reports, plus an "etcetera" category--which requires guess-work to replicate--monographs in the present study were classed separately from technical or statistical reports, from conference proceedings, and from edited collections and anthologies. Pamphlets were placed in a miscellaneous class along with speeches, manuscripts, committee records and other materials.

For journal format, the ALA Glossary refers to a "journal" as:

> A periodical, especially one containing scholarly articles and/or disseminating current information on research and development in a particular subject field;[16]

while a newsletter is distinguished as:

> A serial consisting of one or a few printed sheets containing news or information of interest chiefly to a specific group.[17]

In cases where categorization was not readily apparent from the title proper, this aspect of national audience versus regional or local interest group formed a distinguishing criterion for inclusion in the newsletter class (regional or local scope) and exclusion as a journal source (national or major, wider group appeal). Annual reports were considered separately from these types of serials.

Technical reports were those "giving details and results of a specific investigation or a scientific or technical problem"[18] and included the disciplines of library and information science, the social sciences, and education as well as the natural or pure sciences.

The clearest definition of an edited collection occurs in the 1977

edition of Harrod's Glossary:

> A work consisting of separate items, often written by different people, which has been assembled or prepared for publication by an Editor.[9]

Finally, Harrod's defined a "monograph" as: "a systematic and complete treatise on a particular subject."[10] Library tools such as handbooks, guidebooks, or other reference works were treated as a category separate from monographs, in the present study, to distinguish their use as sources.[11]

Data Collection Methods and Procedures

Line has suggested that a standard code of practice should be followed for the conduct of bibliometric studies, and his specified criteria[13] were applied during the present study of JEL.

Using computerized files, two databases were built for volumes 1 to 24 of JEL. The first database consisted of source article information. The definitional criteria for source articles were applied and, as previously mentioned, the collaboration of professional colleagues was secured in ambiguous cases (see Appendix I). All qualifying source articles were numbered in consecutive order (n=473).

The database of source article information included volume and issue numbers, authorship and author occupation codes, geographic location of contributing author, gender of contributing author, source article subject codes, article pagination, and presence or absence of citations.

Data from each issue of JEL were then analyzed using SPSSx for nine characteristics of the population of published articles: number, length, subject matter, scholarliness, authorship collaboration, occupational status of authors, geographical distribution of authors, gender of authors, and, productivity of authors.

The second database consisted of information about the bibliographic citations contained in JEL source articles. The references cited within each article were consecutively numbered throughout all volumes (n=3655). These citation codes were recorded manually in the journal issues and were input directly into the database from the coded issues. For source articles with no citations, the numeric citation sequence was simply carried forward from the

last-numbered citation. Codes were also input for journal volume, issue date, publication date of the cited work, authorship and/or editorship, type of publication format, and journal title where applicable.

Data were then analyzed using SPSSx for seven characteristics of the population of bibliographic citations in JEL articles: frequency, age, publication format, journal titles, authorship collaboration, productivity of cited authors, and the titles of most frequently cited publications.

Findings

JEL published a total of 473 articles between 1960 and 1984, about 5 works per issue. These articles were written by 424 different authors (366 different first authors and 58 different second authors). The typical article in the 1960s was 7 pages long, but by the 1980s it had doubled in length. The overall proportion of pages in each issue devoted to articles, however, remained relatively constant, at approximately 70 to 75 percent. (See Appendix IV, Tables 1-6.)

Subjects most frequently addressed in JEL during the period of time for which subject indexes are available (1960 to 1980 only) were international and comparative library education, curriculum, and library education. When subjects are ranked by the number of times mentioned in the indexes, the following pattern emerges:

1. international and comparative library education (including status reports on individual countries)
2. curriculum - reference services
3. - design and development
4. - core courses
5. - cataloguing and classification
6. - special librarianship
7. - book selection
8. - aims and objectives
9. library education - aims and objectives
10. - philosophy.

It should be noted that the present descriptive study cannot account for purposive editorial decisions with respect to the subject matter of articles published in JEL. That is to say, do the data reflect the interests of the field, or a lack of papers treating other subjects? Moreover, it should also be noted that the present study cannot account for purposive subject indexing decisions. That is to say, do the data reflect indexer behavior, or the Journal itself? (Each of the 181 subject headings was used about 4 times.

See Appendix IV, Table 7.)

In spite of these perceptual difficulties, it can be stated that there were more mentions of international and comparative library education than of any other subject matter. There was also considerable attention to curriculum and related matters. There was not, however, very much attention to the philosophical aspects of library science education. In the absence of a strong consensus on the philosophical foundations of the field, this paucity of treatment in JEL articles must be regarded as suprising. One would expect the single most important problem for educators to be the nature of underlying philosophy for the education of neophytes. Where is the debate on the kind of discipline which we want--humanistic, managerial, social scientific, technocratic, and so forth?

Since JEL became a refereed journal beginning with volume 12 in 1971, its scholarliness has increased dramatically--at least insofar as a quantitative indicator reveals. Before 1971, just over half of all articles were referenced. Afterwards, this proportion grew steadily. Indeed, in the most recent three volumes, 9 out of 10 articles were referenced.

In a recent master's thesis, noted above, which compared the citations in a random sample of articles for the period 1966-1975 in two journals, Journal of the American Society for Information Science (JASIS) and Nachrichten fur Dokumentation (NFD), Eisenhardt found that 90 percent of JASIS articles were referenced but only 55 percent of NFD articles.[13] On the other hand, in their analysis of citation frequency of articles indexed in volumes 1 to 6 (1966-1971) of Information Science Abstracts, Windsor and Windsor found that 30 percent of the articles contained no citations.[14] Somewhat similarly, in an analysis of the literature of library administration indexed in Library

Literature between 1961 and 1970, Mittermeyer and Houser found that only 17 percent of the articles were referenced.'[3] Also, in an analysis of the literature of cataloguing and classification for the period 1969 to 1980, Frohmann found that 38 percent of the articles were referenced.'[4]

A chi square test was used to verify the hypothesis that refereeing constituted a significant factor in the scholarliness of the Journal. The null hypothesis was disconfirmed (significance= .000). The table below shows the patterns in scholarliness of articles, before and after the adoption of expert refereeing of manuscripts. (Also see Appendix IV, Table 8.)

Table 1. Scholarliness of Articles in JEL, by Refereeing Policy

	Articles with citations	Articles without citations	Total
Before refereeing (1960-1970)	122 (53.0%)	108 (47.0%)	230
After refereeing (1970-1983)	195 (80.2%)	48 (19.8%)	243
Totals	317 (67.0%)	156 (33.0%)	473

X^2 = 54.801,df=1, sig. = .000

Another important, though less dramatic, change since JEL became a refereed journal has been an increase in the frequency of authorship collaboration. During the Journal's first 10 years, the notion of joint authorship of an article was virtually unheard of. By the early 1980s, one out of three articles was authored by two or more individuals. Eisenhardt

found that 63 percent of JASIS articles were single-authored and 83 percent of NFD articles.'' In most fields of the natural and human sciences, collaboration is taken to be a sign of development and maturity--though one must hasten to add that such collaboration is only a crude indicator of cognitive progress. (See Appendix IV, Table 9.)

The following table shows the occupational status of first authors of JEL articles for the period under study.

Table 2. Occupational Status of First Authors of JEL Articles, 1960-1983

Occupational status	Articles	
	Number	Percent
Educators	340	71.9%
Practictioners	100	21.1%
Students--doctoral	15	3.2
--master's	12	2.5
Unidentified	6	1.3
Total	473	100.0%

This table shows that 7 out of 10 first authors were educators. The presence of such a considerable proportion of practitioners raises the interesting question of whether or not the educators are intellectual masters in their own domain. (Also see Appendix IV, Tables 10 and 11.)

An analysis of the geographic distribution of first authors of JEL articles reveals that 90 percent were American and an additional 5 percent were Canadian or British. The remainder were located in 14 other countries. (See Appendix IV, Tables 12-15.)

By gender, two-thirds of first authors were male and one-third were female. (See Appendix IV, Tables 16 and 17.)

Of the 366 first authors published by JEL, over 80 percent of them contributed only one article during the 24-year period under study. Less than 1 percent of all first authors contributed 4 or more articles during this time. These authors were: Bidlack, Galvin, Grotzinger, Schick, Shera, Slavens, and Elizabeth Stone. (Bibliographic data are detailed in Appendix III. Also see Appendix IV, Tables 18 and 19.)

The 473 articles published in JEL during the period under study contained a total of 3,655 bibliographic references. Actually, since one-third of the articles lacked any references at all, as Table 1 above indicates, these 3,655 items were contained in 317 articles. As the average length of an article increased, so did the average number of citations. If both referenced and unreferenced articles are included, the average per paper before refereeing was 4 and afterwards 11. (See Appendix IV, Tables 5 and 6.)

Interestingly, citations in the referenced papers provide another indicator of increasing scholarliness of the Journal, because the average per article before refereeing was 8 and afterwards the average rose to 14; by the 1980s it was 17 citations per article. In the literature of library administration, Mittermeyer and Houser found that there were about 8 citations per referenced article.'' Similarly, Frohmann found about 9 citations per referenced article in the literature of cataloguing and classification.''

This evolving scholarship, however, is somewhat uneven. The range of citations per article goes from 0 to 66. The median falls in the group of 1-4 citations per article. Thus, just over 50 percent of all papers in JEL yielded 0-4 citations each. At the other extreme, a total of 37 papers were

heavily footnoted, producing 25-66 citations each. This skewing accounts for the high overall average citations per article. (See Appendix V, Tables 1-4.)

JEL scholarliness as evidenced by citations depended on recent publications. Almost half of all 3,655 citations were to works less than 5 years old, and over 70 percent to works less than 10 years old. Only 10 percent of all citations were to works older than 20 years. This suggests that JEL authors relied heavily on current materials in the production of their manuscripts. (See Appendix V, Tables 5 and 6.) Frohmann found that the overall median age of cited works in the literature of cataloguing and classification was 4 years.[100] Eisenhardt reported a similar figure for JASIS.[100]

The relative recency of citations is in all likelihood accounted for by the heavy reliance of JEL authors on journals for their bibliographic references. Cited works in journals accounted for 40 percent of all citations, while cited monographs accounted for only 25 percent of the citations. The heavy dependence of authors on the journal literature is another indicator of the scholarliness of JEL, since journals are much more frequently subject to some form of refereeing than are monographs and conference proceedings, which generally have less consistent quality control. Similarly, Eisenhardt found that 47 percent of the works cited in JASIS were to journals and 27 percent to monographs.[102] Mittermeyer and Houser reported 40 percent to journals and 43 percent to monographs, in the literature of library administration.[103] Frohmann reported 44 percent to journals and 23 percent to monographs, in the literature of cataloguing and classification.[104]

Recency exhibited in the works cited in JEL articles is attributable primarily to the journal literature, because 50 percent of journal citations were 4 years or less in age, while the corresponding proportion of cited monographs was 34 percent. (See Appendix V, Tables 7 and 8.)

Up to this point, the data analysis has shown a journal becoming more scholarly on a number of bibliometric dimensions. The strongest evidence for this is the high proportion of citations to journals and the nearly 50 percent of all citations which were 4 years or less in age.

The next question is which journals made up this contribution. All the journals which yielded 15 or more citations were in the domain of library science if one includes information science (Journal of the American Society for Information Science and its predecessor American Documentation) and archives (American Archivist). The table below indicates the distribution of citations to highly cited journal titles.

Table 3. Most Cited Journals in JEL Articles

Journal title	Citations	Scholarly Status
Journal of Education for Librarianship	285	yes
Library Journal	120	no
American Libraries/ALA Bulletin	67	no
College and Research Libraries	58	yes
Library Quarterly	56	yes
Library Trends	42	yes
Special Libraries	38	part
Journal of the American Society for Information Science/American Documentation	36	yes
American Archivist	28	?
Libri	27	yes
Reference Quarterly	27	part
Unesco Bulletin for Libraries	23	yes
Medical Library Association Bulletin	21	yes
Wilson Library Bulletin	21	no
Library Resources and Technical Services/Journal of Cataloguing and Classification	18	part
Illinois Libraries	16	no
Library Association Record	15	no
Sub-total	898	
282 other journals	580	
Total	1,478	

These 17 journal titles yielded almost 900 citations over the period under study. That is to say, 6 percent of the journals received 60 percent of all citations to journals. This is equivalent to an overall median of at least one citation received each year by these most cited titles. At the other extreme, almost 60 percent of the journals received only one citation each during the entire study period. In general terms, the pattern in these journal citation data is that a few journals received many citations while many journals received only a few citations. (See Appendix V, Tables 17 and 18 for a Bradford distribution analysis.)

JEL itself is cited more than twice as often as the next ranking journal,

Library Journal. This attention to JEL is a positive indicator that contributing authors find it relevant to their own scholarship in the field of library science education. On the other hand, Library Journal and at least several more of the most cited journals are preponderantly vehicles for current awareness rather than for research. (In a content analysis of a random sample of articles in 12 issues of Library Journal from 1958 to 1980, Goldhor found that 17 percent of all pages were devoted to articles, and only 12 percent of them were referenced.[105])

Such heavy reliance in JEL articles on news publications raises important questions about the qualitiative nature of that scholarship. A similar concern was raised by Mittermeyer and Houser, who found Library Journal was the most highly cited journal title in the literature of library administration.[106]

It is reasonable to expect that researchers in library science education would look to the research literature of education for pedagogic theories, philosophies, principles, and practices. The data reveal that JEL authors cited 22 education journals about 4 times each over the entire period of time under study. While this is not a large proportion of the citations to the journal literature, no other fields provided more than 1 or 2 journals for citing except psychology with 11 titles which received 37 citations. (Also see Appendix V, Tables 9-11.)

What is true of the pattern of cited journals is also true of the pattern of cited authors: a few individuals received many citations, while many individuals received only a few. A total of 16 authors (less than 1 percent) received 9 percent of all citations. The range of citations for these most cited authors was 10 to 72 times during the study period. This is slightly

less than 1 citation per year over the 24 years for each of these authors. At the other extreme, about 70 percent of all 1,950 authors received only one citation during the entire period. (See Appendix V, Tables 12-14.) In Mittermeyer and Houser's study of the literature of library administration, 76 percent of all authors were cited once.[107] Frohmann's figure for the literature of cataloguing and classification was similar, 73 percent.[108]

The most cited authors in JEL articles were the following:

Table 4. Most Cited First Authors in JEL Articles

Cited author	Citations
American Library Association (and its divisions)	72
Shera	33
Association of American Library Schools	26
Williamson	25
Asheim	22
International Federation of Library Associations	19
Shores	19
Galvin	18
Danton	15
Carnovsky	13
Grotzinger	13
Wasserman	13
Bonk	12
Slavens	11
Lancour	10
Reece	10

Corporate authorship was shown to play a large role in the literatures both of library administration and of cataloguing and classification.[109] Similarly, in JEL, 3 of the 6 most cited authors were professional associations, and the top ranked author was a corporate one, the American

Library Association. With 72 citations over the study period, the Association far surpassed the most cited personal author (Shera) who, with 33 citations, averaged just slightly more than 1 citation per year. (Also see Appendix V, Tables 15 and 16.)

However, the citation prominence of the American Library Association does not issue from any one publication. Although two of its titles were cited at least 5 times during the study period (Library Education and Manpower and Standards for Accreditation, 1972), other citations were distributed throughout a large number of published works.

This was not the case for the two most cited personal authors. Their citation prominence is attributable to a single publication each: Williamson's Training for Library Service in 1923, and Shera's The Foundations of Education for Librarianship in 1972.

Although the overall proportion of citations to journals was higher than the proportion to monographs (40 percent and 25 percent respectively), monographs accounted for the majority of highly cited titles in JEL articles examined here. A total of 12 monographs and 2 pamphlets received 5 or more citations each during the study period. Only 5 journal articles received as many citations. Three of these articles were published in JEL itself.

Table 5 shows the 18 titles which were cited 5 or more times in JEL articles between 1960 and 1984. The range of citations was 17 (5 to 21) for these most cited titles.

Table 5. Most Cited Titles in JEL Articles

Cited title	Author or editor	Pub'n date	Publisher	Number of citations
Training for Library Service	Williamson	1923	monograph	21*
The Foundations of Education for Librarianship	Shera	1972	monograph	16
Education for Librarianship	Berelson	1949	monograph	14
"Education and Manpower for Librarianship"; Library Education and Manpower	Asheim; ALA	1968; 1970	ALAB; pamphlet	11**
Library Education: An International Survey	Bone	1968	monograph	8
The Administrative Aspects of Education for Librarianship: A Symposium	Cassata & Totten	1975	monograph	7
"The Status of 'Practicum' in Graduate Library Schools"	Grotzinger	1971	JEL	7
The Curriculum of Library Schools	Reece	1936	monograph	7
Training for Librarianship before 1923	Vann	1961	monograph	7
"Doctoral Study in Librarianship in The United States"	Danton	1959	CRL	6
Education for Librarianship	Goldhor	1971	monograph	6
The Program of Instruction in Library Schools	Metcalfe & Russell	1943	monograph	6
"The Future of Library Education: 1975 Delphi Study"	Vance & Magrill	1977	JEL	6
Standards for Accreditation, 1972	ALA	1972	pamphlet	5
The Professionalization of Education for Librarianship: with special reference to the years 1940-1960	Carroll	1970	monograph	5
Handbook of Research on Teaching	Gage	1963	monograph	5
"The Case Technique in Education for Reference Service"	Galvin	1963	JEL	5
The Search for a Scientific Profession: Library Science Education in the U.S. and Canada	Houser & Schrader	1978	monograph	5

* includes Vann's re-issue in 1971 of Williamson's work for the Carnegie Corporation under the title The Williamson Reports of 1921 and 1923.

** combines the two versions of this policy statement, Asheim's 1968 draft and ALA's 1970 official release.

Summary and Conclusions

A bibliometric profile of JEL during the period from 1960 to 1984 can be sketched as follows:

- subject emphasis was on international and comparative library education, and curriculum concerns
- 2 out of 3 articles had bibliographic citations, with this proportion growing rapidly in the early 1980s
- 1 out of 3 articles was authored by 2 or more individuals in the early 1980s
- 7 out of 10 first authors were educators, 9 out of 10 were Americans, 2 out of 3 were male
- less than 1 percent of all 366 first authors contributed 4 or more articles to JEL
- 317 articles contained 3,655 citations, on average 8 before JEL became a refereed journal, 14 afterwards, and 17 in the 1980s
- range of citations per articles was 0 to 66, with a median of 1-4
- half of all citations were to works less than 5 years old
- cited works in journals accounted for 40 percent of all citations, monographs for 25 percent
- 6 percent of all cited journals received 60 percent of all citations to journals, with JEL receiving twice as many citations as the next ranked journal
- less than 1 percent of all 1,950 cited authors received 9 percent of all citations, while 70 percent received only 1 citation over the entire study period
- the most cited author was corporate, receiving twice as many citations as the next ranked author, a personal one.

This analysis indicates increasingly rigorous scholarship among library science educators and authors. This is indicated by the increasing frequency and number of bibliographic citations, the increasing length of papers, and collaborative authorship. These are healthy signs for any domain. Similarly, the heavy reliance on journals is an additional positive sign of good scholarship, in that the importance of recent materials is recognized. These indicators provide an insight into the essence of the field: an attempt is being made to enhance intellectual credibility and scholarly status. JEL has evolved from a news journal in the 1960s to a vehicle for scholarly communication in the 1980s.

However, the goal of any field is intellectual consensus, and none of the indices developed in this study point to the existence of such a consensus. There is, on the conceptual level, little interest in the philosophical foundations of library science education. There is no well-defined core of domain problems. Concomitantly, there is no well-developed core of either contributing authors, cited authors, or cited works over the 24-year period examined in this study. Beyond these quantitative estimators, bibliometric analysis must be coupled with critical review of the substantive content of JEL articles, in order to shed further light on the domain thereby represented. This light is all the more important if the policy of JEL is to continue to claim that it is the preeminent journal in library and information science education in the world, the principle channel of scholarly communication among educators in--at least--the English-speaking international community.

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APPENDIX I

ITEMS IN JEL EXCLUDED FROM THE DATABASE OF JOURNAL ARTICLES

A. Items Excluded by the Author

Regular Features:
- Association Activities
- Calendar of Events
- Contributors to [the] Issue
- Editorials: Forum, Notes, Foreword, plus commentary or introductory remarks
- Of Special Interest
- Miscellany
- Reviews
- Research Reports

A.A.L.S. Constitution and By-Laws
Accredited Library School Enrollment Statistics
A.L.A. Committee on Accreditation Annual Report
Directory of the Association of Library Schools

B. Items Excluded by Both Referees

1(1):22 "Equating Professional Library Qualifications" -- no author

2(2):68 "USC Library Education Institute Summary" by Martha Boaz

2(2):105 "Undergraduate Library Conference Report" -- no author

3(1):35 "Reports from Washington: Two Library Training Programs" by John G. Lorenz

3(1):41 "Types of Competence to Fill the Libraries' Changing Role: A Synthesis of Seminar Reports" by Ruth Warnck, compiler

3(1):43 "Educating for Librarianship of the Future: Research and Training--[Panel Discussion]

3(1):53 "Future of Library Education: Proceedings of an Institute--Suggestions, Recommendations, and Proposals; Appendix [Proposed Amendment to the Library Services Act]

3(3):173 "Teaching and Practice of Reference Service" by Julia Ruth Armstrong

3(3):204 "The Life and Times of the Junior Librarian" by Carl W. Hintz

4(4):191 "The Conferences That Were" by Wayne S. Yenawine and Martha Boaz

4(4):207 "The Core Reference Course--Discussion Group Summary" by Guy A. Marco

4(4):216 "The Core Book Selection Course--Discussion Group Summary" by Violet L. Coughlin

4(4):226 "How Articulate is Our Articulation?--

Discussion Group Summary" by Carlyle J. Frarey
4(4):242 "Cataloguing and Classification--Discussion Group Summary" by Florrinell F. Morton
5(1):20 "Reports on Library School Facilities" by: L.D. Carroll, E. Eisenbach, E.J. Humeston, Jr., V. Lawson, C.J. Frarey, R.N. Broadus, and D. Bevis
5(2):87 "Library Education--What's Missing?"
--"A Realistic and Mature Selection Process" by Charles W. Robinson
--"Complex Problems" by Jerrold Orne
--"Select the Students" by Margaret J. Arnold
--"Small Fund of Information" by Ray O. Hummel, Jr.
6(1):19 "Teaching the Selection of Library Materials: An Institute Summary" by Helen Hagan
9(4):296 "A Happening at College Park, Maryland" by Jay E. Daily
10(4):271 "A Symposium at Bloomington" by Jay E. Daily
16(4):245 "Three Reviews on Education for Librarianship" by Robert D. Stevens, J. Periam Danton, and Harold Lancour
18(4):336 "Standards for the Development of Sixth-Year Programs" [adopted by the] A.A.L.S.
19(2):151 "Papers Presented at a Workshop on the Integrated Core Curriculum--Introduction" by Mary Lynn Wilson
19(3):260 "The Accreditation Process--A Position Paper" [adopted by the] A.A.L.S.

C. Items Excluded by One Referee Only

3(1):30 "Reports from Washington: The Legislative Outlook" by Germaine Krettek
8(4):251 "Reflections on the Doctoral Program ..." by Margaret Monroe and others
15(1):3 "Current Sources of Statistics on Library Education" by the A.A.L.S. Statistics Committee
22(1/2):89 "The Conant Report: Three Deans Speak Out:
-- The Original Proposal" by James D. Ramer
--"The Michigan Site Visit" by Russell E. Bidlack
--"A Comment on the Final Conant Report" by Richard L. Darling

APPENDIX II

CODES USED FOR PUBLICATION FORMAT OF JEL BIBLIOGRAPHIC CITATIONS IN JEL ARTICLES

a	annual reports
c	edited collections, anthologies
d	dissertations (Doctoral, Masters)
h	handbooks, guidebooks, manuals, codes, directories, encyclopedias, reference works, union lists
j	journals, bulletins, periodicals
l	legislation, acts, statutes, bills
m	monographs, occasional papers in series
n	newsletters
o	other (see list below)
p	proceedings, annals, transactions, papers of symposia or conferences, institutes, seminars
r	annual reviews
t	technical reports, statistical reports, ERIC reports
v	newspapers
w	personal communications, letters, telephone, interviews
y	yearbooks
z	non-print media (films, television, motion picture, tape, disc)

o OTHER:

addresses, speeches, but if in a journal use j
brochures, pamphlets
committee records, minutes of committees, meetings
course lists, programs, program lists, curricula, syllabus, prospectus
plays
unpublished manuscripts, mimeographed papers, policy, statements, typescripts, working papers

APPENDIX III

AUTHORS WHO CONTRIBUTED 4 OR MORE ARTICLES TO JEL, 1960-1983

Bidlack:

v. 19, spring 1979: "A Statistical Survey of 67 Library Schools, 1978-79"
18, spring 1978: "Faculty Salaries of 62 Library Schools, 1977-78"
17, spring 1977: "Faculty Salaries of 62 Library Schools, 1976-77"
16, spring 1976: "Faculty Salaries of 62 Library Schools, 1975-76"
15, winter 1975: "Faculty Salaries of 62 Library Schools, 1974-75"
16, winter 1974: "Faculty Salaries of 62 Library Schools, 1973-74"

Galvin:

v. 18, spring 1978: "The Profession"s Response to a Crisis-Based Society"
14, spring 1974: "AALS and L.E.D.: A Case for Merger"
10, summer 1969: "The Accreditation Controversy: An Essay in Issues and Origins"
5, spring 1965: "Teaching Reference with Case Studies: An Interim Report"
3, spring 1963: "The Case Technique in Education for Reference Service"

Grotzinger:

v. 17, fall 1976: "Characteristics of Research Courses in Master's Level Churricula"
11, spring 1971: "The Status of 'Practicum' in Graduate Library Schools"
10, spring 1970: "Margaret Mann: The Preparatory Years"
9, summer 1968: "One Road Through the Wood"

Schick:

v. 10, fall 1969: "The Statistical State of U.S. Library Education"
3, spring 1963: "Library Science Research Needs"
3, fall 1962: "Library Science Research"
3, summer 1962: "Manpower Shortage and Library Education"

Shera:

v. 19, summer 1978: "And Gladly Teach"
10, summer 1969: "'Twelve Apostles' and a Few Heretics"
4, winter 1964: "In Defense of Diversity"
1, winter 1961: "An Educational Program for Special Librarians"

Slavens:

v. 19, winter 1979: "A Study of Library Science Dissertations Accepted by the University of Michigan"
11, fall 1970: "Experimenting in Education for Library Associates"
10, fall 1969: "Computer-Assisted Instruction for Reference Librarians"
9, fall 1968: "Films for Teaching"

Stone:

v. 14, spring 1974: "A Call for the Continued Autonomy and Independence of AALS"
12, spring 1972: "Role of AALS in Lifetime Learning for Librarians"
11, summer 1970: "Librarians and Continuing Education"
6, summer 1965: "Methods and Materials for Teaching Library Administration"

APPENDIX IV

DATA TABLES SHOWING BIBLIOMETRIC CHARACTERISTICS OF ARTICLES PUBLISHED IN JEL, 1960-1983

TABLE 1. Number and Length of Articles in JEL, 5-Year Groupings

Years*	Articles No.	Articles %	No. of Articles per Issue	Average Length per Article
1960-64	90	19.0%	4.5	7.6 pages
1965-69	115	24.3	5.8	7.5
1970-74	107	22.6	5.4	9.9
1975-79	98	20.7	4.9	11.1
1980-83	63	13.3	3.9**	13.7
	---	----	---	----
	473	100.0%	4.9	9.6

*In all tables, years are organized by volume, and therefore refer to split years; e.g. 1960-64 refers to 1960/61-1964/65.

**Vol.22, issues no.1 and no.2 were combined but have been treated as individual issues in this calculation.

TABLE 2. Proportion of Pages Devoted to Articles in JEL, 5-Year Groupings

Years	Total pages devoted to: Articles	Other	Total	Proportion of Pages devoted to: Articles	Other
1960-64	685 pages	310 pages	995 pages	68.8%	31.2%
1965-69	865	332	1197	72.3%	27.7%
1970-74	1063	348	1411	75.3%	24.7%
1975-79	1090	418	1508	72.3%	27.7%
1980-83	861	360	1221	70.5%	29.5%
	----	----	----		
Total	4564	1768	6332	72.1%	27.9%

TABLE 3. Length of Articles in JEL

Length	Number	Percent
2 pages	3	.6%
3	16	3.4
4	27	5.7
5	32	6.8
6	51	10.8
7	59	12.5
8	44	9.3
9	35	7.4
10	36	7.6
11	27	5.7
12	28	5.9
13	28	5.9
14	24	5.1
15	12	2.5
16	11	2.3
17	15	3.2
18	6	1.3
19	3	.6
20	6	1.3
21	2	.2
22	3	.6
24	2	.4
27	1	.2
29	1	.2
33	1	.2
43	1	.2
Total	473	100.0%

TABLE 4. Length of Non-Article Material in JEL, 5-Year Groupings

Years	Average Length per Issue
1960-64	15.5 pages
1965-69	16.6
1970-74	17.4
1975-79	20.9
1980-83	22.5
All years	18.6

TABLE 5. Normalized Citations Per Page in JEL Articles

Citations per article page	Articles	
	No.	Percent
0.00	156	33.0%
.01 to .49	87	18.4
.50 to .99	94	19.9
1.00 to 1.49	61	12.9
1.50 to 1.99	30	6.3
2.00 to 2.99	34	7.2
3.00 to 3.99	9	1.9
4.00 to 4.99	1	.2
5.00 to 5.99	1	.2
Total	473	100.0%

TABLE 6. Average Citations Per Page in JEL Articles, 5-Year Groupings

Years	Citations per referenced article page	
	Mean	Median
1960-64	0.9	0.6
1965-69	1.0	0.8
1970-74	1.0	0.8
1975-79	1.2	1.0
1980-83	1.2	0.9

TABLE 7. Most Frequent Subjects in JEL Articles, 5-Year Groupings

Subject	Number of Mentions 1960-64	1965-69	1970-74	1975-79	Total Mentions No.	%
International and comparative library education	3	20	9	4	36	5.3%
Library education (national reports)	3	17	9	4	33	4.9
Reference services--curriculum	8	7	6	7	28	4.1
Curriculum--design and development	2	6	5	12	25	3.7
Library education--aims and objectives	10	2	4	8	24	3.5
Curriculum--core courses	8	6	2	5	21	3.1
Cataloguing and classification--curriculum	6	3	-	4	13	1.9
Library education--philosophy	3	5	2	1	11	1.6
Special librarianship--curriculum	4	1	5	1	11	1.6
Academic librarianship	4	3	3	-	10	1.5
Book selection--curriculum	2	2	6	-	10	1.5
Curriculum--aims and objectives	5	4	1	-	10	1.5
Library schools--faculty	3	4	-	3	10	1.5
All subjects					679	100.0%

*Based on subject heading assignments in the JEL Cumulative Indexes 1960-1975 and 1975-1980; 1981-84 subject headings not available. Number of articles indexed = 410.

TABLE 8. Scholarliness of Articles in JEL, 5-Year Groupings

	Number of Articles			Proportion of Articles	
	With citations	Without citations	Total	With citations	Without citations
1960-64	42	48	90	46.7%	53.3%
1965-69	61	54	115	53.0%	47.0%
1970-74	75	32	107	70.1%	29.9%
1975-79	80	18	98	81.6%	18.4%
1980-83	59	4	63	93.7%	6.3%
Total	317	156	473	67.0	33.0%

TABLE 9. Authorship of Articles in JEL, 5-Year Groupings

	Authorship of Articles			Proportion	
	Single	Joint & multi	Total	Single	Joint & multi
1960-64	88	2	90	97.8%	2.2%
65-69	111	4	115	96.5%	3.5%
70-74	85	22	107	79.4%	20.6%
75-79	73	25	98	74.5%	25.5%
80-83	42	21	63	66.7%	33.3%
Total	399	74	473	84.4%	15.6%

TABLE 10. Articles in JEL by Occupation of First Authors, 5-Year Groupings

	Occupational Status											
	Educators		Practitioners		Students				Unidentified		Total	
					Master's		Doctoral					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1960-64	55	61.1%	28	31.1%	4	4.4%	1	1.1%	2	2.2%	90	71.9%
1965-69	85	73.9	25	21.7	3	2.6	2	1.7			115	21.1
1970-74	79	73.8	18	16.8	3	2.8	7	6.5			107	3.2
1975-79	75	76.5	17	17.3			5	5.1	1	1.0	98	2.5
1980-83	46	73.0	12	19.0	2	3.2			3	4.8	63	1.3
Total	340	71.9	100	21.1	12	2.5	15	3.2	6	1.3	473	100.0

TABLE 11. Articles in JEL by Occupation of Second Author

Occupational Status	Articles	
	Number	Percent
Educators	43	58.1%
Practitioners	21	28.4
Students-doctoral	5	6.8
-master's	3	4.0
Unidentified	2	2.7
Total	74	100.0%

TABLE 12. Articles in JEL by Geographic Location of First Author

Location	Articles	
	Number	Percent
U.S.A.	425	90.2%
Canada	13	2.7
U.K.	11	2.3
Australia	4	.8
Nigeria	4	.8
Japan	3	.6
China, Nationalist Republic (Taiwan)	2	.4
Czechoslovakia	1	.2
Fiji	1	.2
Israel	1	.2
Lebanon	1	.2
New Zealand	1	.2
Phillipines	1	.2
South Africa	1	.2
Thailand	1	.2
U.S.S.R.	1	.2
West Germany	1	.2
Unidentified	1	.2
Total	473	100.0%

TABLE 13. Articles in JEL by Geographic Location of First Author, 5-Year Groupings

Location	1960-64	1965-69	1970-74	1975-79	1980-84	Total No.	%
U.S.A.	86	98	100	89	52	425	90.2%
Canada	1	3	3	4	2	13	2.7
U.K.		6	2	1	2	11	2.3
Australia		2		1	1	4	.8
Nigeria			1	2	1	4	.8
Japan	1	1			1	3	.6
China, Nationalist Republic (Taiwan)		1	1			2	.4
Czechoslovakia		1				1	
Fiji		1				1	
Israel					1	1	
Lebanon				1		1	
New Zealand					1	1	.2
Phillipines		1				1	
South Africa		1				1	
Thailand		1				1	
U.S.S.R.	1					1	
West Germany					1	1	
Unidentified					1	1	
Total	90	115	107	98	63	473	100.0%

TABLE 14. Articles in JEL by Most Frequent State of U.S.A. First Author

State	Articles	
	Number	Percent
New York	44	10.4%
Illinois	41	9.6
Michigan	36	8.5
California	31	7.3
Pennsylvania	30	7.1
Ohio	29	6.8
Wisconsin	21	5.0
District of Columbia	17	4.0
Indiana	17	4.0
North Carolina	17	4.0
Texas	17	4.0
Florida	13	3.0
Kentucky	12	2.8
New Jersey	12	2.8
Other States	88	20.7
Total	425	100.0%

TABLE 15. Articles in JEL by Most Frequent State of U.S.A. First Author, 5-Year Groupings

State	1960-64	1965-69	1970-74	1975-79	1980-83	Total
California	5	6	8	4	8	31
District of Columbia	10	1	3	3		17
Florida	2	2	4	3	2	13
Illinois	15	9	6	4	7	41
Indiana	1	2	5	6	3	17
Kentucky	1	4	5	2		12
Michigan	3	12	7	11	3	36
North Carolina	1		2	10	4	17
New Jersey	7	4	1			12
New York	14	10	10	7	3	44
Ohio	5	8	10	4	2	29
Pennsylvania	4	11	7	6	2	30
Texas	1	1	3	10	2	17
Wisconsin	4	11	3	1	2	21
Other States	14	16	26	18	14	88
Total	90	115	107	98	52	425

TABLE 16. Gender of First Authors of Articles in JEL

	Number	Percent
Female	162	34.2%
Male	285	60.3
Could not be identified	26	5.5
Total	473	100.0%

TABLE 17. Gender of Second Authors of Articles in JEL

	Number	Percent
Female	33	44.6%
Male	36	48.6
Could not be identified	5	6.8
Total	74	100.0%

TABLE 18. Productivity of First Authors in JEL

Number of Articles	Number of Authors*	Cumulative Frequency Authors Number	Authors Percent	Articles Number	Articles Percent
1	297	297	81.1%	297	62.8%
2	41	338	92.3	379	80.1
3	21	359	98.1	442	93.4
4	5	364	99.5	462	97.7
5	1	365	99.7	467	98.7
6	1	366	100.0	473	100.0

*excluding their productivity if second-named authors

TABLE 19. Productivity of Second and Multi Authors in JEL

Number of Articles	Number of Authors*	Cumulative Frequency Authors No.	Authors %	Articles No.	Articles %
1	70	70	97.2%	70	94.6%
2	2	72	100.0	74	100.0

*excluding their productivity if first-named authors

APPENDIX V

DATA TABLES SHOWING BIBLIOMETRIC CHARACTERISTICS OF WORKS CITED IN JEL ARTICLES, 1960-1983

Table 1. Works Cited in JEL Articles, 5-Year Groupings

Years	Total Citations	Average Citations per Referenced Article	Average Citations per All Articles
1960-64	315	7.5	3.5
1965-69	496	7.5	4.3
1970-74	762	10.2	7.1
1975-79	1067	13.3	10.9
1980-83	1015	17.2	16.1
Total	3655	11.5	7.7

Table 2. Works Cited in JEL Articles, by Refereeing Policy

	Total Citations	Average Citations per Referenced Article	Average Citations for All Articles
Before refereeing (1960-1970)	994	8.1	4.3
After refereeing (1971-1983)	2661	13.6	11.0
Total	3655	11.5	7.7

Table 3. Frequency of Citations in JEL Articles, 5-Year Groupings

Number of Articles

Citations Per Article	1960-64 No.	P.	1965-69 No.	P.	1970-74 No.	P.	1975-79 No.	P.	1980-83 No.	P.	Total No.	P.
0	48	53.3%	54	47.0%	32	29.9%	18	18.4%	4	6.3%	156	33.0%
1- 4	22	24.5	26	22.6	23	21.5	14	14.2	10	15.9	95	20.1
5- 9	10	11.1	17	14.8	22	20.6	24	24.5	12	19.0	85	17.9
10-14	5	5.6	8	7.0	10	9.3	14	14.3	11	17.5	48	10.2
15-19	1	1.1	2	1.7	9	8.4	10	10.2	9	14.3	31	6.6
20-24	1	1.1	6	5.2	6	5.6	5	5.1	3	4.8	21	4.4
25+	3	3.3	2	1.7	5	4.7	13	13.3	14	22.2	37	7.8
Total	90	100.0%	115	100.0%	107	100.0%	98	100.0%	63	100.0%	473	100.0%

Table 4. Frequency of Citations in JEL Articles

Citations Per Article	No. of Articles	Total Citations	Cumulative Frequency Citations No.	Citations P.	Articles No.	Articles P.
0	156	0	0	0%	156	33.0%
1	30	30	30	.8	186	39.4
2	30	60	90	2.4	216	45.7
3	19	57	147	4.0	235	49.7
4	16	64	211	5.8	251	53.1
5	15	75	286	7.8	266	56.3
6	17	102	388	10.6	283	59.9
7	15	105	493	13.4	298	63.1
8	21	162	661	18.1	319	67.5
9	17	153	814	22.3	336	71.1
10	17	170	984	26.9	353	74.7
11	13	143	1127	30.1	366	77.5
12	5	60	1187	32.5	371	78.6
13	10	130	1317	36.0	381	80.7
14	3	42	1359	37.1	384	81.3
15	5	75	1434	39.2	389	82.4
16	7	112	1546	42.3	396	83.8
17	7	119	1665	45.6	403	85.3
18	6	108	1773	48.5	409	86.6
19	6	114	1887	51.6	415	87.9
20	5	100	1987	54.4	420	88.9
21	5	105	2092	57.2	425	90.0
22	6	132	2224	60.8	431	91.3
23	3	69	2293	62.7	434	91.9
24	2	48	2341	64.0	436	92.3
25	4	100	2441	66.7	440	93.2
26	3	78	2519	68.9	443	93.8
27	1	27	2546	69.7	444	94.0
28	2	56	2602	71.2	446	94.5
29	3	87	2689	73.6	449	95.1
30	1	30	2719	74.4	450	95.3
31	4	124	2843	77.7	454	96.2
32	2	64	2907	79.5	456	96.6
35	2	70	2977	81.6	458	97.0
36	1	36	3013	82.4	459	97.2
37	2	74	3087	84.5	461	97.5
39	1	39	3126	85.5	462	97.6
40	2	80	3206	87.7	464	98.1
41	2	82	3288	89.9	466	98.5
45	1	45	3333	91.9	467	98.7
46	2	92	3425	93.7	469	99.2
51	1	51	3476	95.1	470	99.3
53	1	53	3529	96.6	471	99.5
60	1	60	3589	98.1	472	99.7
66	1	66	3655	100.0	473	100.0

Table 5. Age of Works Cited in JEL Articles--Summary

Age in years	Citations No.	Citations P.	Cumulative Frequency No.	Cumulative Frequency P.
less than 1	77	2.1%	77	2.1%
1-4	1596	43.6	1673	45.7
5-9	911	25.0	2584	70.7
10-14	397	10.8	2981	81.5
15-19	207	5.7	3188	87.2
20-24	108	2.9	3296	90.1
25-29	74	2.0	3370	92.1
30-39	67	1.8	3437	93.9
40-49	83	2.3	3520	96.2
50-99	78	2.2	3598	98.4
100-174	6	.2	3604	98.6
Unknown	51	1.4	3655	100.0
Total	3655	100.0%	3655	100.0%

Table 6. Age of Works Cited in JEL Articles

Age in years	Citations No.	Citations F.	Cumulative Frequency No.	Cumulative Frequency F.
less than 1	77	2.1%	77	2.1%
1	394	10.8	471	12.9
2	486	13.3	957	26.2
3	396	10.8	1353	37.0
4	320	8.8	1673	45.8
5	224	6.1	1897	51.9
6	213	5.8	2110	57.7
7	169	4.6	2280	62.4
8	177	4.8	2456	67.2
9	128	3.5	2586	70.7
10	122	3.3	2707	74.0
11	90	2.5	2796	76.4
12	75	2.1	2871	78.5
13	68	1.9	2939	80.4
14	42	1.1	2981	81.5
15	68	1.9	3049	83.4
16	36	1.0	3085	84.4
17	42	1.1	3127	85.6
18	33	.9	3160	86.5
19	28	.8	3188	87.2
20-24	108	2.9	3296	90.2
25-29	74	2.0	3370	92.2
30-39	67	1.8	3437	94.0
40-49	83	2.2	3520	96.3
50-59	42	1.1	3562	97.5
60-69	13	.3	3575	97.8
70-79	18	.4	3593	98.3
80-89	4	.1	3597	98.4
90-99	1	.1	3598	98.4
103	1	.1	3599	98.4
134	1	.1	3600	98.4
163	1	.1	3601	98.4
165	2	.1	3603	98.4
174	1	.1	3604	98.5
Unknown	51	1.4	3655	98.6
Total	3655	100.0%	3655	100.0%

Table 7. Publication Format of Works Cited in JEL Articles

Format	Citations No.	P.
Journals	1483	40.6%
Monographs	910	24.9
Edited Collections	263	7.2
Handbooks, guidebooks	213	5.8
Technical reports	138	3.8
Proceedings	123	3.4
Dissertations	77	2.1
Personal communications	69	1.9
Newsletters	49	1.3
Yearbooks	35	1.0
Annual Reviews	25	.7
Newspapers	22	.6
Non-print media	16	.4
Annual reports	10	.3
Legislation	8	.2
Other	214	5.8
Total	3655	100.0%

Table 8 Publication Format of Works Cited in JEL Article 5-Year Groupings

Years	Journals		Monographs		Edited Collect.		Hdbks., Gdbks		Tech. Reps.		All Formats	
	No.	P.	No.	P.	No.	P.	No.	P.	No.	P.	No.	P.
1960-64	136	9.1%	75	8.2%	30	11.4%	8	3.7%	5	3.6%	315	8.6%
1965-69	185	12.5	125	13.8	44	16.7	29	13.6	8	5.8	496	13.6
1970-74	316	21.3	204	22.4	48	18.3	35	16.5	36	26.1	762	20.8
1975-79	384	25.9	260	28.6	72	27.4	78	36.6	53	38.4	1067	29.2
1980-83	462	31.2	246	27.0	69	26.2	63	29.6	36	26.1	1015	27.8
Total	1483	100.0%	910	100.0%	263	100.0%	213	100.0%	138	100.0%	3655	100.0%

Table 9. Citation Yield of Journals Cited in JBL Articles

Number of Journals	Number of Citations	Cumulative Frequency Journals No.	Journals P.	Citations No.	Citations P.
1	285	1	.3%	285	19.0%
1	120	2	.6	405	27.1
1	67	3	1.0	472	31.5
1	58	4	1.3	530	35.4
1	56	5	1.7	586	39.2
1	42	6	2.0	628	41.9
1	38	7	2.0	666	44.5
1	36	8	2.7	702	46.9
1	28	9	3.1	730	48.8
2	27	11	3.8	784	52.4
1	23	12	4.1	807	53.9
2	21	14	4.7	849	56.7
1	18	15	5.1	867	57.9
1	16	16	5.5	883	58.9
1	15	17	5.8	898	59.9
1	14	18	6.1	912	60.9
1	13	19	6.5	925	61.7
2	12	21	7.2	949	63.4
1	11	22	7.5	960	64.1
4	9	26	8.9	996	66.5
3	8	29	9.9	1020	68.1
4	7	33	11.3	1048	70.0
4	6	37	12.6	1072	71.6
11	5	48	16.4	1127	75.2
16	4	64	21.8	1191	79.6
18	3	82	27.9	1245	83.2
41	2	123	41.9	1327	88.6
170	1	293	100.0	1497	100.0

Table 10. The Six Most Cited Journals in JEL Articles, 5-year Groupings

	JEL		LJ		AL/ALAB		CRL		LQ		LT	
Years	No.	P.	No	P.	No.	P.	No.	P.	No.	P.	No.	P.
1960-64	16	5.6%	27	22.5%	8	12.0%	11	19.0%	14	25.0%	5	11.9%
1965-69	29	10.2	30	25.0	12	17.9	12	20.7	5	8.9	9	21.4
1970-74	74	26.0	13	10.8	8	12.0	10	17.2	12	21.4	9	21.4
1975-79	63	22.1	28	23.3	22	32.8	14	24.1	17	30.4	12	28.6
1980-83	103	36.1	22	18.3	17	25.3	11	19.0	8	14.3	7	16.7
Total	285	100.0%	120	100.0%	67	100.0%	58	100.0%	56	100.0%	42	100.0%

Table 11. Subject Discipline of Journals Cited 2 or More Times in JEL Articles

Field*	Total Journals	Total Citations	Citations Per Journal
Business/Economics	1	5	5
Education	22	80	4
General Interest-U.S.A.	1	2	2
Humanities-Comprehensive	1	2	2
Law	1	3	3
Library and Information Science	56	1084	19
Linguistics	1	7	7
Literature	1	2	2
Literary/Political Reviews	1	2	2
Photography	1	2	2
Political Science	1	4	4
Psychology	11	37	3
Public Administration	1	4	4
Publishing and Book Trade	1	2	2
Sciences-Comprehensive	2	12	6
Social Sciences-Comprehensive	1	2	2
Sociology	4	9	2
Theater	1	8	8
Total	108	1262	12

*As listed in Ulrich's International Periodical Directory, 23rd ed., 1984.

Table 12. Citation Yield of First Authors Cited in JEL Articles*

Number of Citations	Number of Authors	Cumulative Frequency Citations No.	Citations P.	Authors No.	Authors P.
1	1407	1407	41.9%	1407	72.2%
2	283	1973	58.7	1690	86.7
3	112	2309	68.7	1802	92.4
4	57	2537	75.5	1859	95.3
5	27	2672	79.5	1886	96.7
6	20	2792	83.1	1906	97.7
7	11	2869	85.4	1917	98.3
8	12	2965	88.2	1929	98.9
9	4	3001	89.3	1933	99.1
10	2	3021	89.9	1935	99.2
11	1	3032	90.2	1936	99.2
12	1	3044	90.6	1937	99.3
13	3	3082	91.7	1940	99.4
15	1	3098	92.2	1941	99.5
18	1	3116	92.7	1942	99.5
19	2	3154	93.9	1944	99.6
22	2	3204	95.4	1946	99.7
25	1	3229	96.1	1947	99.8
26	1	3255	96.8	1948	99.8
33	1	3288	97.9	1949	99.9
72	1	3360	100.0%	1950	100.0%

*Some cited works had an editor only, while others were anonymous or authorship was missing from the bibliographic entry.

Table 13. Citation Yield of Second Authors* Cited in JEL Articles

Number of Citations	Number of Authors	Cumulative Frequency Citations No.	Citations P.	Authors No.	Authors P.
1	280	280	63.3%	280	80.9%
2	47	374	84.6	327	94.5
3	13	413	93.4	340	98.3
4	2	421	95.2	342	98.8
5	3	436	98.6	345	99.7
6	1	442	100.0	346	100.0

* co-authored and second-named of multi-authored works.

Table 14. Citation Yield of Editors Cited in JEL Articles

Number of Citations	Number of Editors*	Cumulative Frequency Citations No.	Citations P.	Editors No.	Editors P.
1	149	149	42.6%	149	69.9%
2	35	219	62.6	184	86.4
3	15	264	75.4	199	93.4
4	4	280	80.0	203	95.3
5	6	310	88.6	209	98.1
6	1	316	90.2	210	98.6
8	1	324	92.6	211	99.1
11	1	335	95.7	212	99.5
15	1	350	100.0%	213	100.0%

*126 citations were to editor-only titles (103 editors).

TABLE 15. Type of Authorship of Works Cited in JEL Articles

Authorship	Citations No.	P.
Single	2395	65.5%
Joint	374	10.2
Multi	127	3.5
Editor only	139	3.8
Corporate	429	11.7
Not Given	191	5.2
Total	3655	100.0%

Table 16. Type of Authorship of Works Cited in JEL Articles, 5-Year Groupings

Years	Single		Joint(co-)		Multi		Editor		Corporate		Not Given		Total
	No.	P.	No.	P.	No.	P.	No.	P.	No.	P.	No.	P.	
1960-64	224	9.4%	12	3.2%	4	3.1	10	7.2%	39	9.1%	26	13.6%	315
1965-69	341	14.2	24	6.4	11	8.7	24	17.3	59	13.8	37	19.4	496
1970-74	524	21.9	85	22.7	32	25.2	28	20.1	65	15.1	28	14.7	762
1975-79	659	27.5	114	30.5	41	32.3	48	34.5	153	35.7	52	27.2	1067
1980-83	647	27.0	139	37.2	39	30.7	29	20.9	113	26.3	48	25.1	1015
Total	2395	100.0%	374	100.0%	127	100.0%	139	100.0%	429	100.0%	191	100.0%	3655

Table 17. Application of a Bradford Distribution to Journal Citations in JEL Articles, 1960-1983

Calculations:

Predicted Zone Size (Cumulative)	Observed Journal Rank (Cumulative)	Normalized Zone Series	Zone Ratios	Predicted End Ranks (Cumulative)	Deviation (Predicted-Observed)
m=530	4	4-4=1	35-4=9	4	-
2m=1060	35	35-4=9	386-35=11	40	+5
3m=1590	293[386]	386-4=97	i.e.,1:10:100	400	[+14]

Interpretation:

Applying a Bradford distribution to the 1497 works cited in 293 journals in JEL articles,

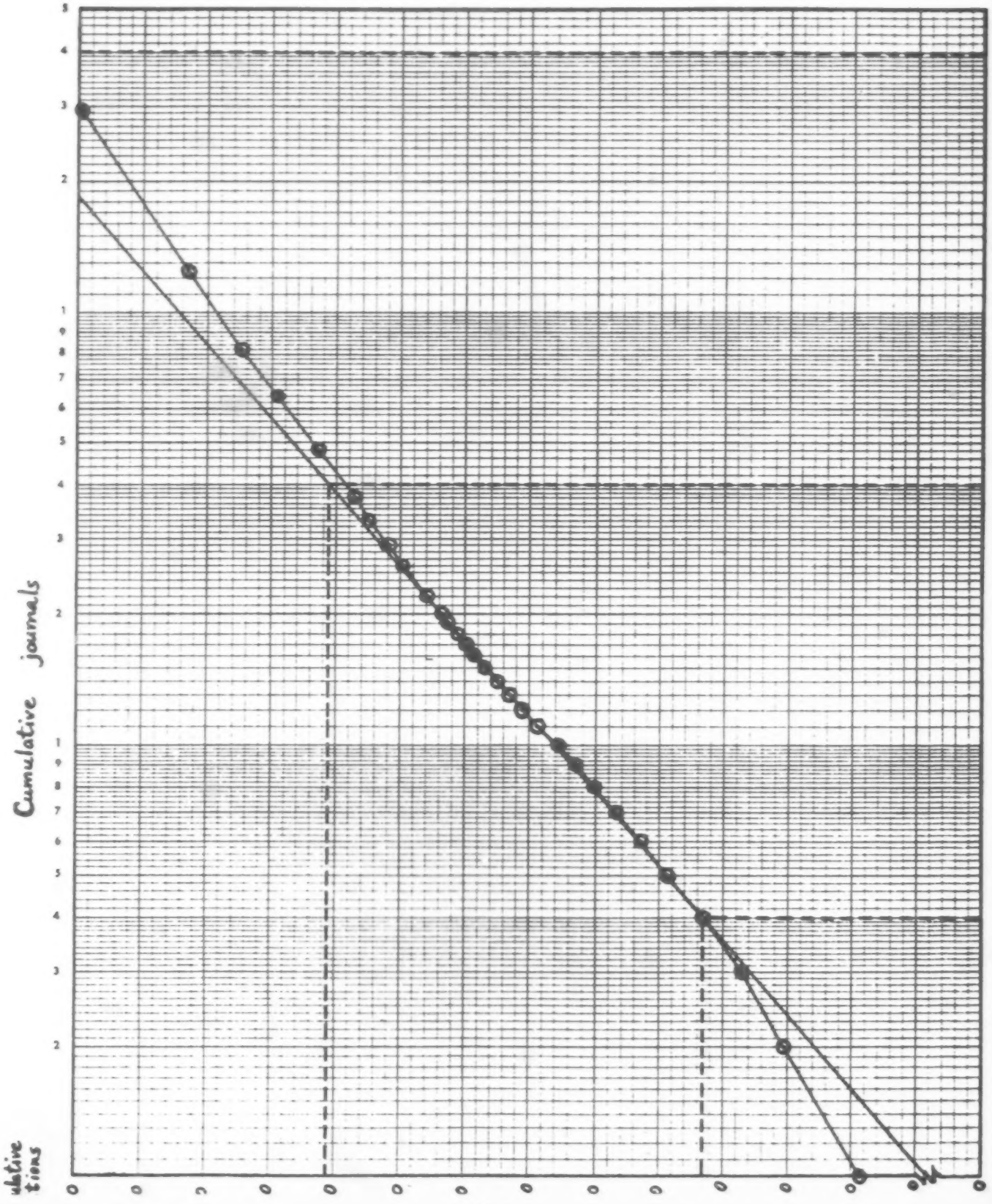
core(c)=4
zone size(m)=530
multiplier(n)=10

The core of 4 journals produced a nucleus of 530 citations.
In order to add another 530 citations (i.e., zone 1) would require the output of an additional 31 journals.
In order to add another 530 citations (i.e., zone 2) would require the output of an additional (and hypothetical) 347 journals.

One may conclude that the 4 journals in the core are by far the most valuable to the producers of this literature.
They are: JEL, LJ, AL, and CRL.

With c=4, the core is small and manageable.
With m=530, there is a relatively large nucleus of citations but still an acceptable range of diversity.
However, when n=10 (i.e., 10 is the Bradford multiplier), there is a large scatter in this literature. The series is 1: 10: 100.
Multiplying anything by 10 begins to give very large numbers.

Table 18. Graphical Representation of a Bradford Distribution applied to Journal Citations in JEL Articles, 1960-1983



APPENDIX VI

PROJECT COSTS

Expenditures*

Database preparation	(200 hrs)	$2,160.
coding	(90 hrs)	
entry	(80 hrs)	
editing	(30 hrs)	
Text processing	(155 hrs)	$1,670.
entry	(55 hrs)	
editing	(100 hrs)	
Computer costs		$1,000.
Research and writing	(50 hrs)	$ 540.
Research materials		$ 180.
Total		$5,550.

Funding Sources

Association for Library and Information Science Education, Special Research Grant Award ($1,000 U.S.)	$1,240.
Small Faculties Endowment Fund - Support for the Advancement of Scholarship, University of Alberta	$2,660.
Faculty of Library Science, University of Alberta	$1,650.
Total	$5,550.

*excluding the Principal Investigator's time and office overhead